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ABSTRACT

The United States Training and Employment Service General Aptitude Test Battery (GATB), first published in 1947, has been included in a continuing program of research to validate the tests against success in many different occupations. The GATB consists of 12 tests which measure nine aptitudes: General Learning Ability; Verbal Aptitude; Numerical Aptitude; Spatial Aptitude; Form Perception; Clerical Perception; Motor Coordination; Finger Dexterity; and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, and a standard deviation of 20. Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, when combined, predict job performance. Cutting scores are set only for those aptitudes which aid in predicting the performance of the job duties of the experimental sample. The GATB norms described are appropriate only for jobs with content similar to that shown in the job description presented in this report. A description of the validation sample and a personnel evaluation form are also included. (AG)

October 1969 United States Training and Employment Service Technical Report S-444

S-444

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Development of USTES Aptitude Test Battery

for

Photograph Finisher

(any ind.) I 976.886

TM 002 056

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MANPOWER ADMINISTRATION

ED 069631

Technical Report on Development of USTES Aptitude Test Battery

For . . . .

Photograph Finisher (any ind.) I 976.886

S-444

(Developed in Cooperation with the
Wisconsin State Employment Service)

U. S. Department of Labor
Manpower Administration

October 1969

FOREWORD

The United States Training and Employment Service General Aptitude Test Battery (GATB) was first published in 1947. Since that time the GATB has been included in a continuing program of research to validate the tests against success in many different occupations. Because of its extensive research base the GATB has come to be recognized as the best validated multiple aptitude test battery in existence for use in vocational guidance.

The GATB consists of 12 tests which measure 9 aptitudes: General Learning Ability, Verbal Aptitude, Numerical Aptitude, Spatial Aptitude, Form Perception, Clerical Perception, Motor Coordination, Finger Dexterity, and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, with a standard deviation of 20.

Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, in combination predict job performance. For any given occupation, cutting scores are set only for those aptitudes which contribute to the prediction of performance of the job duties of the experimental sample. It is important to recognize that another job might have the same job title but the job content might not be similar. The GATB norms described in this report are appropriate for use only for jobs with content similar to that shown in the job description included in this report.

GATB Study # 2771

Development of USTES Aptitude Test Battery

For

Photograph Finisher (any ind.) I 976.886-010

S-444

This report describes research undertaken for the purpose of developing General Aptitude Test Battery (GATB) norms for the occupation of Photograph Finisher (any ind.) I 976.886-010. The following norms were established:

GATB Aptitudes	Minimum Acceptable GATB Scores
V-Verbal Aptitude	90
P-Form Perception	75

Research Summary

Sample:

59 female workers employed as Photograph Finishers in Wisconsin. Sixteen of these were identified as Negroes and two were identified as American Indians. The remainder were non-minority group members.

Criterion:

Supervisory ratings.

Design:

Concurrent (test and criterion data were collected at approximately the same time).

Minimum aptitude requirements were determined on the basis of a job analysis and statistical analyses of aptitude mean scores, aptitude-criterion correlations and selective efficiencies.

Concurrent Validity:

Phi Coefficient = .36 ($P/2 < .005$)

Effectiveness of Norms:

Only 68% of the nontest-selected workers used for this study were good workers; if the workers had been test-selected with the above norms, 82% would have been good workers. Thirty-two percent of the nontest-selected workers used for this study were poor workers; if the workers had been test-selected with the above norms, only 18% would have been poor workers. The effectiveness of the norms is shown graphically in Table 1:

TABLE I

Effectiveness of Norms

	Without Tests	With Tests
Good Workers	68%	82%
Poor Workers	32%	18%

SAMPLE DESCRIPTION

Size:

N = 59

Occupational Status:

Employed Workers.

Work Setting:

Workers were employed by L. L. Cook Co. of Milwaukee, Wisconsin.

Employer Selection Requirements:

Education: None required.

Previous Experience: None required.

Tests: None used.

Other: Personal interview.

Principal Activities:

The job duties for each worker are comparable to those shown in the job describition in the Appendix.

Minimum Experience:

All workers in the final sample had at least two months job experience.

TABLE 2

Means, Standard Deviations (SD), Ranges and Pearson Product-Moment Correlations with the Criterion (r) for Age, Education, Experience, and Cultural Exposure.

	Mean	SD	Range	r
Age (years)	32.0	10.8	18-61	-.103
Education (years)	11.8	1.2	8-16	.047
Experience (months)	31.4	22.6	2-97	.403**
Cultural Exposure	6.8	2.0	3-11	.132

**Significant at the .01 level.

EXPERIMENTAL TEST BATTERY

All 12 tests of the GATB, B-1002B, and the Research Questionnaire-Background were administered during June, 1969.

CRITERION

The criterion data consisted of supervisory ratings of job proficiency made at approximately the same time as the tests were administered with a time interval of two weeks between the two ratings. The immediate supervisor rated each worker.

Rating Scale:

USES Form SP-21 "Descriptive Rating Scale" was used. The scale (see Appendix) consists of nine items covering different aspects of job performance. Each item has five alternative responses corresponding to different degrees of job proficiency.

Reliability:

A reliability coefficient of .953 was obtained between the initial ratings and the re-ratings, indicating a significant relationship. The final criterion score consists of the combined scores of the two ratings.

Criterion Score Distribution:

Possible Range:	18-90
Actual Range:	35-90
Mean:	63.4
Standard Deviation:	13.8

Criterion Dichotomy:

The criterion distribution was dichotomized into low and high groups by placing 32% of the sample in the low group to correspond with the percentage of workers considered unsatisfactory or marginal. Workers in the high criterion group were designated as "good workers" and those in the low group as "poor workers." The criterion critical score is 54.

APTITUDES CONSIDERED FOR INCLUSION IN THE NORMS

Aptitudes were selected for tryout in the norms on the basis of a qualitative analysis of job duties involved and a statistical analysis of test and criterion data. Aptitudes G, V, and S were considered for inclusion in the norms because they have high correlations with the criterion. Aptitudes P, Q, K and F, which do not have high correlations with the criterion, were considered for inclusion in the norms because the qualitative analysis indicated that the aptitudes might be important for the job duties and the sample had relatively high mean scores on these aptitudes. Tables 3, 4 and 5 show the results of the qualitative and statistical analyses.

TABLE 3

Qualitative Analysis
(Based on the job analysis, the aptitudes indicated appear to be important to the work performance)

Aptitudes	Rationale
P - Form Perception	Required in visually inspecting films for clarity.
Q - Clerical Perception	Required in recording lot numbers and identification information.
K - Motor Coordination	Required in mounting prints onto cards and splicing film.
F - Finger Dexterity	Required in placing reels of film into trimming machines and threading film through the machine.

TABLE 4

Means, Standard Deviations (SD), Ranges and Pearson Product-Moment Correlations with the Criterion (r) for the Aptitudes of the GATB; N=59

	Mean	SD	Range	r
G - General Learning Ability	92.2	18.0	64-145	.307*
V - Verbal Aptitude	98.3	16.7	68-139	.324*
N - Numerical Aptitude	92.0	19.9	56-146	.225
S - Spatial Aptitude	94.6	17.6	61-137	.259*
P - Form Perception	102.8	19.7	62-142	.184
Q - Clerical Perception	115.5	18.9	72-164	.173
K - Motor Coordination	103.3	17.1	74-140	.126
F - Finger Dexterity	105.9	22.4	39-156	.177
M - Manual Dexterity	99.8	23.9	51-162	.225

*Significant at the .05 level.

TABLE 5

Summary of Qualitative and Quantitative Data

Type of Evidence	Aptitudes								
	G	V	N	S	P	Q	K	F	M
Job Analysis Data									
Important					X	X	X	X	
Irrelevant									
Relatively High Mean					X	X	X	X	
Relatively Low Standard Dev.									
Significant Correlation with Criterion	X	X		X					
Aptitudes to be Considered for Trial Norms	G	V		S	P	Q	K	F	

DERIVATION AND VALIDITY OF NORMS

Final norms were derived on the basis of the degree to which trial norms consisting of various combinations of aptitudes G, V, S, P, Q, K and F at trial cutting scores were able to differentiate between the 68% of the sample considered to be good workers and the 32% of the sample considered to be poor workers. Trial cutting scores at five-point intervals approximately one standard deviation below the mean are tried because this will eliminate about one-third of the sample with three-aptitude norms. For four-aptitude trial norms, cutting scores of slightly less than one standard deviation below the mean will eliminate about one-third of the sample; for two-aptitude trial norms, minimum cutting scores of slightly more than one standard deviation below the mean will eliminate about one-third of the sample. The Phi Coefficient was used as a basis for comparing trial norms. Norms of V-90 and P-75 provided optimum differentiation for the occupation of Photograph Finisher (any ind.) I 976.886-010. The validity of these norms is shown in Table 6 and is indicated by a Phi Coefficient of .36 (statistically significant at the .005 level).

TABLE 6

Concurrent Validity of Test Norms
V-90 and P-75

	Nonqualifying Test Scores	Qualifying Test Scores	Total
Good Workers	9	31	40
Poor Workers	12	7	19
Total	21	38	59

Phi Coefficient = .36 Chi Square (χ^2_y) = 7.6

Significance Level = $P/2 < .005$

DETERMINATION OF OCCUPATIONAL APTITUDE PATTERN

The data for this study did not meet the requirements for incorporating the occupation studied into any of the 36 OAP's included in Section II of the Manual for the General Aptitude Test Battery. The data for this sample will be considered for future grouping of occupations in the development of new occupational aptitude patterns.

A-P-P-E-N-D-I-X

WSES-1004 (3/67)
SP-21

JOB PERFORMANCE RATING FORM
(For Aptitude Test Development Studies)

JOB TITLE _____ SCORE _____
D.O.T. TITLE AND CODE

WORKER'S EXPERIENCE _____ JOB TRAINING PERIOD _____
(Exact number of months) (months)

DIRECTIONS: Please read the sheet "Suggestions to Raters" and then fill in the items listed below. In making your ratings, only one box should be checked for each question.

NAME OF WORKER (print) _____
(last) (first)

SOCIAL SECURITY NUMBER _____ SEX: Male _____ Female _____

COMPANY _____ LOCATION _____

COMPANY JOB TITLE: _____

RATED BY _____ TITLE _____

How often do you see this worker in a work situation?

☐ See him at work all the time.

☐ See him at work several times a day.

☐ See him at work several times a week.

☐ Seldom see him in work situation.

How long have you worked with him?

☐ Under one month.

☐ One to two months.

☐ Three to five months.

☐ Six months or more.

A. How much work can he get done? (Worker's ability to make efficient use of his time and to work at high speed.)

- ☐ 1. Capable of very low work output. Can perform only at an unsatisfactory pace.
- ☐ 2. Capable of low output. Can perform at a slow pace.
- ☐ 3. Capable of fair work output. Can perform at a acceptable but not a fast pace.
- ☐ 4. Capable of high work output. Can perform at a fast pace.
- ☐ 5. Capable of very high work output. Can perform at an unusually fast pace.

B. How good is the quality of his work? (Worker's ability to do high-grade work which meets quality standards.)

- ☐ 1. Very poor. Does work of unsatisfactory grade. Performance is inferior and almost never meets minimum quality standards.
- ☐ 2. Not too bad, but the grade of his work could stand improvement. Performance is usually acceptable but somewhat inferior in quality.
- ☐ 3. Fair. The grade of his work is mediocre. Performance is acceptable but usually not superior in quality.
- ☐ 4. Good, but the grade of his work is not outstanding. Performance is usually superior in quality.
- ☐ 5. Very good. Does work of outstanding grade. Performance is almost always of the highest quality.

C. How accurate is he in his work? (Worker's ability to avoid making mistakes.)

- ☐ 1. Very inaccurate. Makes very many mistakes. Work needs constant checking.
- ☐ 2. Inaccurate. Makes frequent mistakes. Work needs more checking than is desirable.
- ☐ 3. Fairly accurate. Makes mistakes occasionally. Work needs only normal checking.
- ☐ 4. Accurate. Makes few mistakes. Work seldom needs checking.
- ☐ 5. Highly accurate. Rarely makes a mistake. Work almost never needs checking.

D. How much does he know about his job? (Worker's understanding of the principles, equipment, materials and methods that have to do directly or indirectly with his work.)

- ☐ 1. Has very limited knowledge. Does not know enough to do his job adequately.
- ☐ 2. Has little knowledge. Knows enough to "get by."
- ☐ 3. Has moderate amount of knowledge. Knows enough to do fair work.
- ☐ 4. Has broad knowledge. Knows enough to do good work.
- ☐ 5. Has complete knowledge. Knows his job thoroughly.

E. How much aptitude or facility does he have for this kind of work? (Worker's adeptness or knack for performing his job easily and well.)

- ☐ 1. Very low aptitude. Has great difficulty doing his job. Not at all suited to this kind of work.
- ☐ 2. Low aptitude. Usually has some difficulty doing his job. Not too well suited to this kind of work.
- ☐ 3. Moderate aptitude. Does his job without too much difficulty. Fairly well suited to this kind of work.
- ☐ 4. High aptitude. Usually does his job without difficulty. Well suited to this kind of work.
- ☐ 5. Very high aptitude. Does his job with great ease. Unusually well suited for this kind of work.

F. How large a variety of job duties can he perform efficiently? (Worker's ability to handle several different operations in his work.)

- ☐ 1. A very limited variety. Cannot perform different operations adequately.
- ☐ 2. A small variety. Can perform few different operations efficiently.
- ☐ 3. A moderate variety. Can perform some different operations with reasonable efficiency.
- ☐ 4. A large variety. Can perform several different operations efficiently.
- ☐ 5. An unusually large variety. Can do very many different operations efficiently.

G. How resourceful is he when something different comes up or something out of the ordinary occurs? (Worker's ability to apply what he already knows to a new situation.)

☐ 1. Very unresourceful. Almost never is able to figure out what to do. Needs help on even minor problems.

☐ 2. Unresourceful. Often has difficulty handling new situations. Needs help on all but simple problems.

☐ 3. Fairly resourceful. Sometimes knows what to do, sometimes doesn't. Can deal with problems that are not too complex.

☐ 4. Resourceful. Usually able to handle new situations. Needs help on only complex problems.

☐ 5. Very resourceful. Practically always figures out what to do himself. Rarely needs help, even on complex problems.

H. How often does he make practical suggestions for doing things in better ways? (Worker's ability to improve work methods.)

☐ 1. Never. Sticks strictly with the routine. Contributes nothing in the way of practical suggestions.

☐ 2. Very seldom. Slow to see new ways to improve methods. Contributes few practical suggestions.

☐ 3. Once in a while. Neither quick nor slow to see new ways to improve methods. Contributes some practical suggestions.

☐ 4. Frequently. Quick to see new ways to improve methods. Contributes more than his share of practical suggestions.

☐ 5. Very often. Extremely alert to see new ways to improve methods. Contributes an unusually large number of practical suggestions.

I. Considering all the factors already rated, and only these factors, how satisfactory is his work? (Worker's "all-round" ability to do his job.)

☐ 1. Definitely unsatisfactory. Would be better off without him. Performance usually not acceptable.

☐ 2. Not completely satisfactory. Of limited value to the organization. Performance somewhat inferior.

☐ 3. Satisfactory. A fairly proficient worker. Performance generally acceptable.

☐ 4. Good. A valuable worker. Performance usually superior.

☐ 5. Outstanding. An unusually competent worker. Performance almost always top notch.

October 1969 S-444

FACT SHEET

Job Title: Photograph Finisher (any ind.) I 976.886-010

Job Summary:

Performs a combination of tasks involved with mounting and marking photographic films, film strips and prints, and splicing film strips.

Work Performed:

Places reels of film into spool of slitting machine, threads film through machine that slits films longitudinally. Visually inspects films for clarity and writes identifying information on tags. Places films onto racks and attaches identifying tags onto each film to identify ownership. Places mounting cards into trimming machine and separates trimmed cards by lot number. Reads lot numbers on finished films and prints and places them into packages. Records identifying information on package. Mounts prints onto specified cards by lot number, using hand-operated cementing press or feeds cards and prints into automatic press. Manually splices together film strips and winds them on reel, recording lot numbers in sequence.

Effectiveness of Norms:

Only 68% of the nontest-selected workers used for this study were good workers; if the workers had been test-selected with the S-444 norms, 82% would have been good workers. Thirty-two percent of the nontest-selected workers used for this study were poor workers; if the workers had been test-selected with the S-444 norms, only 18% would have been poor workers.

Applicability of S-444 Norms:

The aptitude test battery is applicable to jobs which include a majority of the duties described above.

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